Intel Developer Update is Intel's monthly online news magazine for developers. As the official publication of developer.intel.com, it brings hardware, software, and Web developers the latest information on Intel initiatives, technologies, platforms, and products.

Cover Story

Each month, we run a cover story on the most significant industry announcement, trend, or development for the month.

Featured Articles

Delivering in-depth reports on key platforms, products and technologies, our featured articles provide a monthly source of information on issues affecting developers. Be sure to check in every month for the latest developments driving the evolution of the industry.

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Cover Story

3D on the Web Becomes a Practical Reality

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Overview

Three-dimensional graphics enhance the interactivity and quality of online games and entertainment, and make experiences such as shopping and online learning more impactful, enjoyable, and practical. Until now, however, 3D on the Web has been limited to niche markets, primarily because of a fragmented market environment. With the latest version of Director* 8.5 Shockwave* Studio, Macromedia and Intel are providing developers with an easy way to deliver scalable, bandwidth-friendly interactive 3D Web content to an audience of millions.

Director 8.5 Shockwave Studio from Macromedia incorporates Intel® Internet 3D Graphics Software, an adaptive geometry and rendering engine developed at Intel Architecture Labs. These algorithms enable 3D content to scale to the client's machine, thus allowing the 3D experience to be automatically tailored to each user's system. The software also enables content providers to create high-performance and interactive yet bandwidth-friendly photorealistic images, cartoon rendering, particle effects, and animations for the Web.

With a pervasive playback technology for 3D on the Web content (Macromedia Shockwave* Player), Web developers will have a variety of opportunities to bring the heightened impact and interactivity of 3D graphics to their sites. Developers of 3D content for CD-ROM will find that the Web now offers a new channel for advertising, marketing, and even delivering products. Users may come to expect leading Web sites to offer interactive 3D capabilities.

Advantages of 3D

Well-executed interactive 3D content can make nearly any Web site more compelling and effective:

- 3D text, logos, cartoons, and graphic elements can better attract, engage, and inform Web visitors, increasing a site's "stickiness" and making it easier to communicate critical information.
- Online retail sites can increase sales and reduce returns by using 3D technologies. For example, clothing retailers can give shoppers a realistic idea of how an item of clothing will look on their particular body types.
- E-learning sites can provide a more interactive experience that increases the likelihood that the student will understand and remember the information.
- 3D on the Web also offers new opportunities for traditional game vendors, who can create browser-based versions of their existing games, develop new games exclusively for the Web, and show 3D trailers or demos on the Web.

The market is ready for 3D. More than 50 percent of home PCs run at 333 MHz or higher (Dataquest, "PC Forecasts by Microprocessor Speed," 1998–2002), and a large portion of home PCs have 3D hardware acceleration and the needed memory. The 56K modem has become the de facto minimum standard, and the number of homes with broadband access will nearly quadruple between 1999 and 2003, according to Jupiter Communications ("U.S. Online Households by Access Speed," 1998–2003).

So why hasn't 3D on the Web taken off? A primary reason has been the lack of a widely used development environment and player for 3D graphics on the Web. Developers had to choose among various niche solutions, modifying and customizing their applications for each player they wanted to support. Compounding the problem, the wide range of client systems has forced developers to either write to the lowest common denominator, thus limiting the quality of the content they produce, or else write different versions of their code for users with differing levels of computing power.

Intel and Macromedia Team Up

Because Intel is strongly committed to empowering Web developers and enhancing users' Internet experience, researchers at Intel Architecture Labs developed a content authoring and delivery solution for 3D on the Web. To deliver it to a very broad audience they teamed up with Macromedia, provider of both the world's most widely used player–Shockwave Player–for multimedia Web content and the robust Director authoring environment. The results of this teamwork are incorporated in Macromedia Director 8.5 Shockwave Studio and Shockwave Player.

Clearly, any solution for 3D Web graphics would have to deliver excellent performance over today's transmission channels. Ideally, it should provide scalability with respect to bandwidth: it should run well over a 56K modem, and even better over a broadband connection.

An ideal solution would also provide scalability with respect to CPU performance: it would automatically adjust, or scale, the performance and resolution of the 3D experience to match available client processing power. Scalable technologies offer "author once" simplicity that eliminates the need for developers to create multiple versions of content, freeing them to innovate on the highest performance PCs.

Scalability enables developers to shorten time-to-market. At the same time, it increases the user's enjoyment by tailoring the 3D experience to the performance level of his or her PC.

3D Graphics Technology Elements

Intel Internet 3D Graphics Software provides a toolkit for developing scalable, bandwidth-friendly 3D graphics. The graphics algorithms use Adaptive 3D Geometry to deliver highly scalable 3D content that provides an outstanding experience on performance PCs while still running well on basic systems. It enables the delivery of 3D content with multiple resolutions, and offers the best possible experience by automatically increasing or decreasing 3D quality based on the computing power of the system.

Intel has enhanced these capabilities for the Web environment, embedded them in a powerful rendering engine, utilized sophisticated streaming techniques to make the most of available bandwidth, and worked with Macromedia to integrate them into Director 8.5 Shockwave Studio and Shockwave Player. Figures 1 and 2 show how multi-resolution mesh lets developers scale performance to two different PCs.

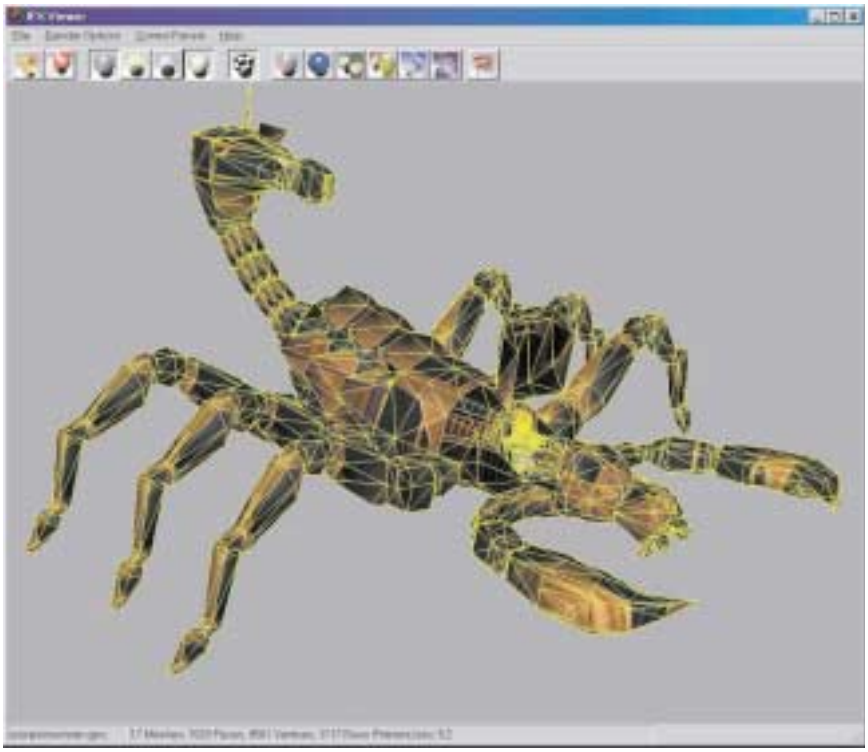

Figure 1. A scorpion model with a high polygon count (7020 faces).

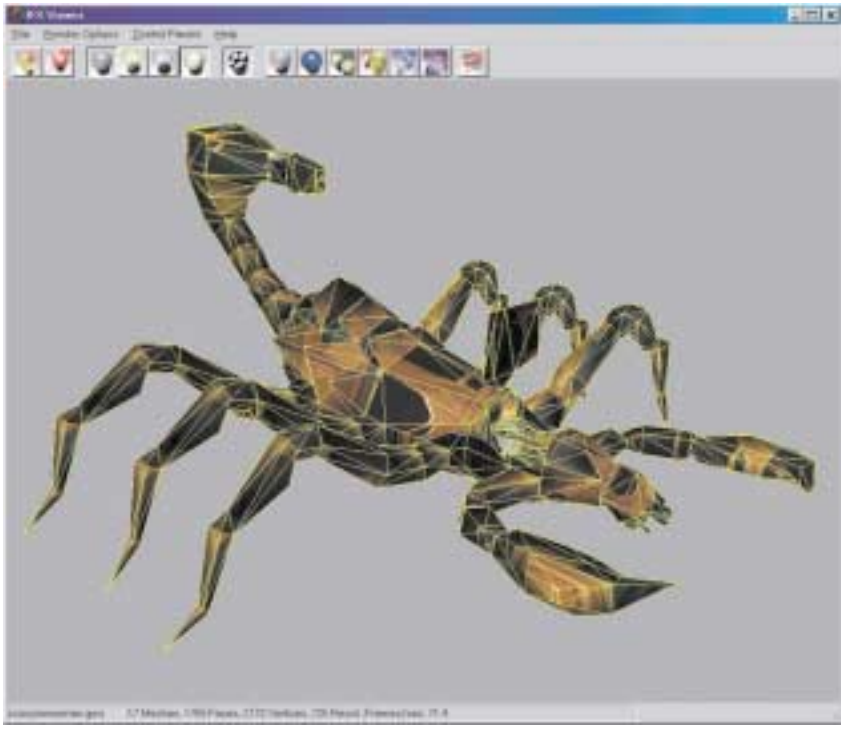

Figure 2. Same scorpion model with a lower polygon count (1758 faces) using Multires 2 RT.

Multi-Resolution Mesh (MRM)

The more detailed the mesh that represents an object, the more finely detailed is the rendered image. High-resolution models are more visually appealing, but they produce larger files, which take longer to transmit to a client PC and require more processing power to render.

To compensate, developers often create a high-resolution model for closeups or places where visual detail is important, and a low-resolution version for views that are farther from the "camera" or where visual detail is less necessary. The downside to this approach is the extra work involved to create multiple models and, often, a "snap" perceptible when moving between the high- and low-resolution models. Developers have to create, maintain, and store multiple versions of the model, then these multiple versions must be transmitted to the user's PC.

MRM provides an alternative approach: the developer creates a single high-resolution model, plus parameters that allow vertices of the model to be removed as needed. The number of polygons can be adaptively changed at run time depending on parameters such as the available CPU power, the distance from the camera viewpoint, and the targeted frame rate.

In addition, MRM enables progressive downloads when run in reverse. The model is initially downloaded at its lowest resolution, and the resolution is progressively increased as additional data for the model pours in over time. This means objects can look smoother, more lush and realistic, and they can scale depending on the available bandwidth and the processing capability of the client.

Subdivision Surfaces (Subdiv)

Subdivision surfaces can be thought of as the inverse of MRM. The developer creates a low-resolution model, and the client adaptively enhances it by adding detail triangles. Subdivision surfaces smooth out the mesh, and work especially well for curved surfaces and terrains. This technique minimizes the size of the file transported across the Internet, yet it provides high-quality models to the client for rendering. The content developer can easily control the quality to scale with the processing power available on the client.

Bones Animation

It's highly bandwidth intensive to send a fully detailed model for each frame in a traditional 3D character animation. Bones animation (Figure 3) enables developers to put "bones" inside a character and create real-time character animation by transmitting just the "bones" data points instead of all the data points for the entire model, the movements associated with the "bones," and the instructions for reconstructing the model. Adaptive algorithms provide realistic deformation effects when the skeleton is animated. This feature improves transmission time, reduces development time, and enhances viewing quality. For relatively complex models, bones animation also makes it possible to transmit the same animation content with a fraction of the bandwidth previously needed.

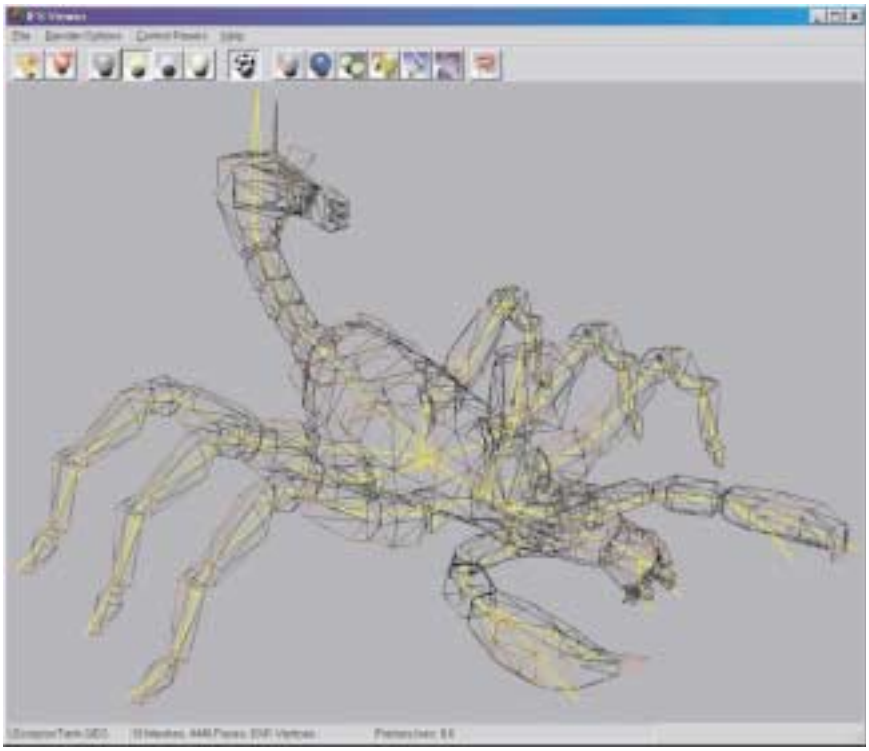

Figure 3. Bones animation improves transmission time, reduces development time and enhances viewing quality.

Non-Photorealistic Rendering (NPR)

With NPR, developers can render 3D models or scenes into comic book drawings, pencil sketches, watercolor paintings, or other drawing styles. This feature simplifies development, enables developers to get the most out of their 3D models, and adds variety to 3D content. Instead of having to draw every frame of an animation, the developer can capture the 3D model, use bones to animate it, and render every frame.

Particle System Effects

Particle systems make it easy to create realistic effects that can simulate such behaviors as smoke, fire, water, dust, sparks, vapor, and explosions. The "particles" can range from points and lines to complex 3D models in themselves, and the number of particles in an effect can vary from a few to several thousand. The particles can be controlled to follow a given direction, can be assigned colors, and can be set to simulate behavior under gravity or wind.

The particle effects are scalable. A content developer can author a greater number of highly detailed particles on performance PCs and a smaller number of lower resolution particles on slower systems. On Intel® Pentium® III and Pentium® 4 processor-based PCs, particle rendering may take advantage of these systems' special floating-point processing capabilities.

A Comprehensive Solution

With Intel Internet 3D Graphics Software integrated into Macromedia Director 8.5 Shockwave Studio, developers have a comprehensive solution for authoring scalable 3D content for the Web and delivering it to end users via Shockwave Player. Director is Macromedia's application for developing magnetic Internet destinations and powerful multimedia. Shockwave Player, which is distributed free, is already installed in more than 200 million PCs and Macintosh* computers, and 250,000 installations are performed each day. When encountering Shockwave 3D content on the Web, users will have the option to automatically update their Shockwave Player. Shockwave Player is also preinstalled on all new Windows* 98, Windows 2000, and Macintosh systems.

Director combines graphics, sound, animation, text, and video to create streaming, multi-user, interactive Web content that is easy to deploy for CD-ROM, DVD-ROM, and the Web. In addition to its 3D enhancements, Macromedia Director 8.5 Shockwave Studio streamlines the authoring process with centralized, automated functions that make it easier to manage assets, edit complex animations, build graphics on the fly, and create dynamic content for low-bandwidth delivery.

Lingo*, Director's object-oriented language, provides more than 800 commands to control 3D interactivity, imaging, sound, vector shapes, scaling, rotation, alpha channels, Internet connectivity, and much more. Lingo's dot syntax is comfortable for programmers who are familiar with languages such as JavaScript* or Visual Basic*, and the language scales to support large projects like text-intensive Web sites and tutorials. Behaviors provide the building blocks necessary for the fast and easy design of custom, interactive interfaces–they are the "short cuts" for Lingo.

A powerful linked media feature gives developers the flexibility to create a Shockwave movie shell that can bring in a given piece of Shockwave 3D content at run time and apply certain functionality to it, such as basic inspect-and-examine options. Through Xtras *, Director provides developers with the ability to create new plug-in modules to provide additional functionality.

Many Macromedia applications support the Macromedia Open Architecture, which provides a rich multimedia platform for both Macromedia and third parties to extend application functionality. Hundreds of thousands of copies of Director have been sold, and the huge community of developers has taken advantage of the open architecture to create an enormous library of Xtras that can be used to add functionality.

Macromedia Director 8.5 Shockwave Studio provides developers with a straightforward, economical business model. There are no licensing fees for Shockwave Player, and no complicated fee structures and royalty payments for content authored using Director. Director also ships with Shockwave Multiuser Server 3, which supports 2,000 simultaneous users. This greatly simplifies the development of massively multi-user online applications, where thousands of users can interact with one another in immersive 3D Web environments. And because Shockwave Player is free, developers can distribute it with CD-ROMs, DVD-ROMs, or on intranet sites.

The Macromedia and Intel solution for 3D is supported throughout the industry. Leading providers of 3D software tools and content services such as Alias* Wavefront*, Discreet*, NxView*, and Softimage* have announced their intention to use the 3D-enhanced Shockwave Player as a primary delivery platform for the Web. This means developers can continue to use their favorite tools and systems to create 3D content, bring it into Director to author streaming, multi-user, interactive Web content, and distribute the results via Shockwave Player.

Figures 4 through 6 show the same 3D model in a modeling package, in Director*, and in a Web browser, respectively. Three-dimensional graphics can be created in an object modeling package (Figure 4), obtained from prebuilt models, or captured using a 3D camera or scanner. Developers can then import them into Director 8.5 Shockwave Studio to add interactivity and combine them with other elements such as sound, animation, text, and video (Figure 5). The results can then be displayed in the user's browser (Figure 6), using either hardware or software rendering.

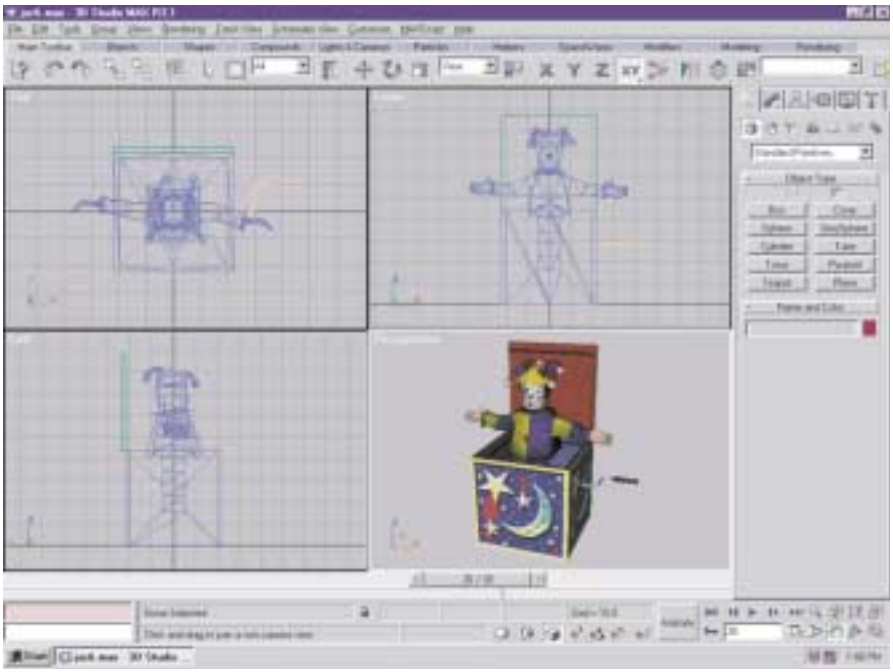

Figure 4. 3D object created in an object modeling package.

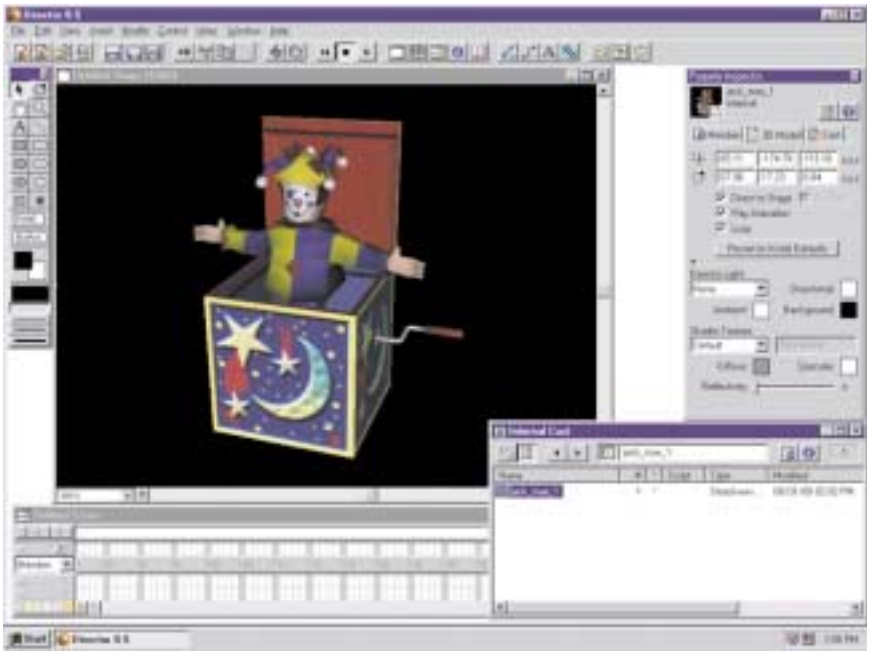

Figure 5. 3D object imported into Director* 8.5 Shockwave* Studio.

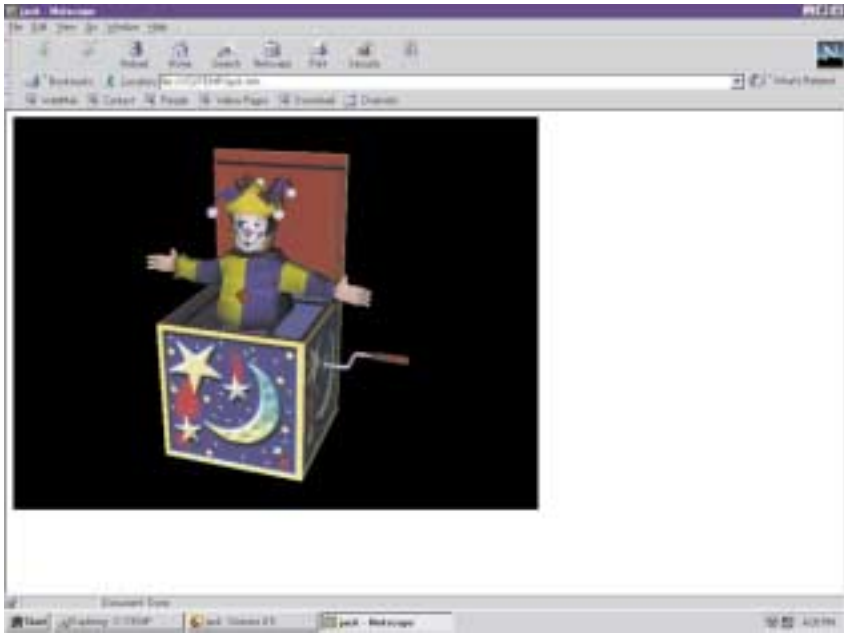

Figure 6. 3D object displayed in the users browser.

Summary

With the inclusion of adaptive 3D graphics capability for the Web (3D on the Web), Macromedia and Intel bring high-performance, professional-quality 3D into the Web mainstream. The relative trickle of 3D on the Web today will likely grow to flood stage as Web sites take advantage of the immediacy, interactivity, and ease of development offered by Director 8.5 Shockwave Studio. With the growth of 3D on the Web, tools and content developers are expected to fill the need for prebuilt 3D models.

With Macromedia Director 8.5 Shockwave Studio, developers will find it easier than ever to meet the rising demand for interactive 3D Web content. At the same time, developers of 3D content for CD-ROM and Digital Video Interactive (DVI) applications will find that the Web now offers an exciting new channel for advertising, marketing, and showcasing their products.

More Info

Visit the Macromedia Web site to learn more about developing and distributing Shockwave 3D content and to purchase Director 8.5 Shockwave Studio.

For more information about Intel Internet 3D Graphics Software, including the full white paper titled “Macromedia Director* 8.5 Shockwave* Studio with Intel® Internet 3D Graphics Software,” go to the Intel® 3D Software Technologies area of the Intel Architecture Labs site.

Author Bio

Gary Baldes is an engineering manager in the Intel Architecture Labs, working on the Intel Internet 3D Graphics software launch. In his 12 years at Intel, he has also worked on the Intel® 3D Software Toolkit, Intel® Realistic Display Mixer (RDX), and DVI projects. He holds four patents and has received an Intel Achievement Award. Gary holds a B.S. in computer and information sciences from Seton Hall University. Before joining Intel, he worked at Dun & Bradstreet.

Column

From the Editor
Donna Loveland
Managing Editor
Intel Developer Update Magazine
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Column

The recent news about the Intel® Pentium® 4 processor at 1.7 GHz may tempt you to think that Intel developers are exclusively focused on high-performance silicon. This issue of *Intel Developer Update* shows there's a lot more going on–and going forward with an array of industry players.

Our cover story is devoted to the latest in online 3D graphics—MacroMedia's Shockwave* Studio, which incorporates Intel® software. Need services for your development project? Intel is working with HelloBrain to offer an intellectual capital exchange. As peer-to-peer computing evolves through an industry consortium, PC Ease of Use focuses on built-in reliability, and desktop boards assist in legacy removal, Intel developers are there, chipping in to advance your development work.

Here's the latest:

3D on the Web Becomes a Practical Reality—cover story—Macromedia Director* 8.5 Shockwave Studio with Intel® Internet 3D Graphics software incorporated has the potential to make 3D on the Web the industry norm. Now developers can make online games, shopping, entertainment, and other content more compelling than ever.

Reduce Development Time with the Intellectual Exchange—Intel is taking advantage of HelloBrain's online brokerage services to create a Web-based service exchange for Intel-oriented development projects. Participants can gain access to platforms for applications development, test, and verification.

New Initiatives in Peer-to-Peer Computing—Peer-to-peer computing offers huge potential for accomplishing supercomputer-level tasks with existing resources. A number of diverse companies are investing in peer-to-peer, and a recently formed industry consortium is playing an active role in defining infrastructure standards.

Intel Offers Boot-to-USB in Desktop Boards—Intel's boot-to-USB support, a capability of the BIOS on desktop motherboards, is an integrated step toward removing legacy interfaces. It expands system flexibility and provides an additional tool for system maintenance.

PC Ease of Use Includes Robustness—The Intel® Ease of Use Initiative is widening its focus from making the PC simple to set up, expand, and use. In concert with key industry groups, it's working on guidelines for improving reliability, interoperability, and "no defect found."

Next month, be sure to visit *Intel Developer Update* for continuing in-depth information for developers.

Author Bio

Donna Loveland is the editor of *Intel Developer Update* magazine. She joined Intel's Technology and Initiatives Marketing group in 1999 as the editor of Platform Solutions News. Donna began her career with Intel in 1982 as a technical editor in an advanced microprocessor development group. Since then, she's held communications positions in leading-edge technology areas ranging from stereoscopic display to digital broadcast to scalable online content. Donna has a B.A. degree in English from the University of Rochester and an M.A. in expository writing from the University of Iowa.

Departments

Desktop

Intel Offers Boot-to-USB in Desktop Boards

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Overview

New Intel® Desktop Boards support the ability to boot to Universal Serial Bus (USB) devices. This feature, known as boot-to-USB, is a BIOS capability that allows a PC to boot from a USB device such as a CD-ROM drive, Zip* disk, or floppy drive. Systems integrators and end users find this capability expands a system's flexibility and provides an additional tool for system maintenance. System developers, particularly those designing reduced legacy or legacy-free systems, welcome this integrated step toward removing obsolete, slow, and complicated legacy interfaces.

Using the Boot-to-USB Feature

End users and system integrators can enable the boot-to-USB feature using the BIOS setup utility. Users can not only enable and disable booting from USB, they can also customize the USB boot order. The boot order determines the sequence a system follows when scanning floppy, CD/DVD, hard drives, and now USB drives searching for a bootable device. For example, a USB bootable device could be configured to be first in the boot order, preceding the hard drive. This configuration would be useful for troubleshooting or configuring legacy-free systems, which may not have a floppy drive.

Technical Details

The BIOS on Intel Desktop Boards is an Intel-customized and modified version of the American Megatrends, Inc. (AMI) core.

Several key BIOS changes facilitated the USB boot capability. These include the addition of modules that act as a miniature USB driver for bulk storage devices and as a USB-to-ATAPI/IDE translator. The architecture of the boot to USB BIOS implementation is shown in Figure 1.

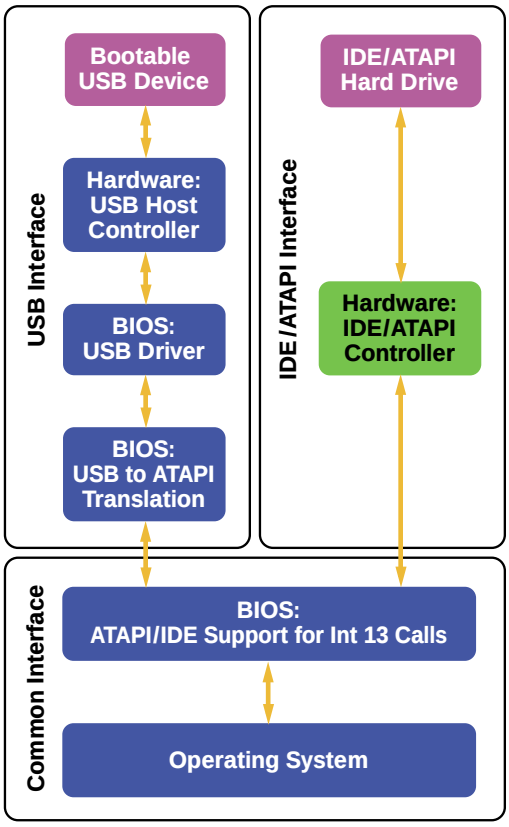

Figure 1. Architecture of the boot to USB BIOS.

- *USB driver module.* The Intel Desktop Board BIOS supports two standards for communication with USB devices: Control Bulk Interrupt (CBI), and the more common Bulk Only Transfer (BOT). The USB driver module initializes and scans the bus, searching for possible bootable USB devices. It reads the USB device descriptors looking for bulk storage devices. Communication with USB devices is then established to determine whether the devices are bootable. When a USB device is found to be bootable, an internal flag is set to note its status.
- *USB-to-ATAPI translation module.* When implementing a new technology, the effect that the feature will have on existing methods and standards is an engineering consideration. This approach to boot-to-USB places critical emphasis on complying with the existing IDE (Integrated Drive Electronics)/ATAPI standards, to avoid the need for special software drivers or operating system modifications.

The USB-to-ATAPI/IDE translation module is tasked with bringing USB bulk storage transactions into compliance with standard ATAPI/IDE protocols. This module feeds into the existing BIOS code, which handles Int 13 BIOS calls. (An Int 13 call is the way software is able to access a hard drive to read and write information.) The operating system can rely on standard Int 13 BIOS calls working regardless whether the boot device is an external USB device or an internal IDE hard drive.

USB device developers can make use of the Intel® boot-to-USB feature by following industry USB standards, specifically either CBI or BOT. Detailed USB specifications can be found at the USB Developers Web site.

Applications

The boot-to-USB feature offers systems integrators, developers, and end users enhanced flexibility, convenience, and support. Boot-to-USB applications provide:

- *Increased flexibility* by allowing a computer to boot from an increasingly popular USB interface, which is already built into most peripheral devices.
- *Convenient switching* between operating systems (such as Microsoft Windows* and Linux*) by booting from media in an external USB device.
- *Support for replacing, repairing, or recovering data* from a damaged hard drive image. With boot-to-USB enabled, the end user has the option to run diagnostic utilities and debug damaged internal system devices through a USB-bootable device.
- *An array of mass storage options* for end users requiring large bootable devices.

Previously, legacy-free systems could be frustrating to work with because of the limitations of legacy-free bootable devices such as floppy drives, since legacy-free systems do not include floppy disk drive (FDD) controllers. With boot-to-USB support, systems that do not have integrated floppy drives will, through the use of a USB drive, regain the ability to boot to a floppy.

Summary

Intel leads the industry by providing boot-to-USB capability integrated into the BIOS on its Desktop Boards. Systems integrators and developers as well as end users welcome the convenience, flexibility, and support that boot-to-USB provides.

More Info

For more information on the boot-to-USB feature on Intel Desktop Boards, check out the Intel Desktop Boards Web site.

Author Bio

Dan Ragland is responsible for supporting the technical aspects of new Desktop Board products and technologies. Dan is currently a member of Desktop Board product development teams supporting future Intel® Pentium® 4 processor board designs, sustaining the Intel® D815EEA product family, and supporting emerging desktop technologies. Dan joined Intel in 1998 as a member of the motherboard development operation.

Christopher Basurto joined the Intel motherboard design group in 1997. Previously, Christopher was a member of various new Desktop Board product development teams, where he supported design and new technologies. Christopher is currently focusing on BIOS engineering and strategic software projects, and supporting regional OEM software marketing.

PC Ease of Use Includes Robustness

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Overview

Intel® Ease of Use Initiative has focused the last few years on simplifying the PC, but it is now widening its focus to assist the PC industry in enhancing overall PC robustness. Key Ease of Use Initiatives include the Easy PC Initiative, the PC Quality Roundtable, and the Commercial Roundtable. All of these efforts are working to provide guidelines for improving three key elements of robustness for the PC: reliability, interoperability, and the complex issue of "no defect found."

A Push for Robustness on the PC

Windows* XP will combine the ease-of-use of Windows Me with the high reliability of Windows 2000. To achieve a balanced system, the robustness of the underlying hardware will become increasingly important as well. The Intel Ease of Use Initiative, which has concentrated on making the PC easier to set up, expand, and use, is now widening its focus to help developers optimize their products and drivers to be efficient and compatible in order to ensure the PC's robustness.

The initiative defines the ultimate goal for its robustness effort as assisting with the development of a PC that never crashes, is always available, and is capable of remaining at the center of the user's digital world (See Figure 1). To achieve these objectives, the Ease of Use Initiative has defined robustness to include three key elements that will require improvements:

- *Reliability*. Improving reliability includes eliminating deviations of the PC from functioning as designed due to environment, hardware, or software failures. Reliable PCs do not need to be rebooted periodically to combat gradual performance degradation.
- *Interoperability*. Improving interoperability means that when users add hardware or software, or alter settings, the system performs as expected without unwanted side effects or partial failures. It also means that when users attempt to connect their PCs to other devices such as Personal Digital Assistants (PDAs) or cell phones, all of the devices work and talk to each other the way they should.
- *No defect found*. The goal here is to eliminate cases where the user returns a system believing it has defects and won't work, but where the problems causing the return cannot be reproduced or validated by the manufacturer or point of sale.

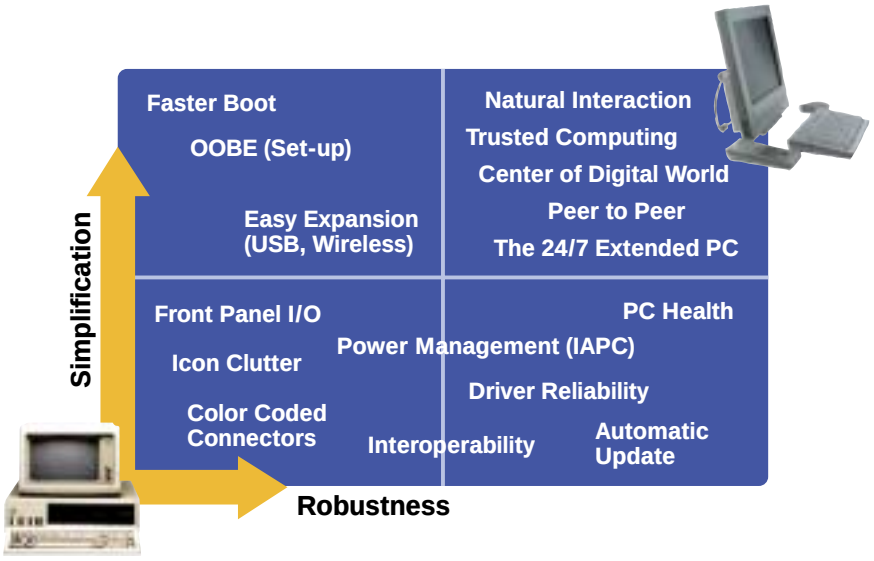

Figure 1. Intel will continue to focus on simplification but will also put a heavier focus on robustness.

Causes of Robustness Problems

The key causes of the PC's robustness problems can, to a large extent, be blamed on the fact that new PC technologies are constantly under development. As a result, when developing a new product, application, or driver, a developer may be working with a beta version of the OS that is not 100 percent stable or even with a beta version of the software development kit (SDK) or driver development kit (DDK). Alternatively, developers may test products with existing hardware and have them running perfectly until a new incompatible product comes out and causes problems.

Robustness problems can include everything from bugs in the drivers, where drivers crash or work with some hardware but not others, to incompatibility of the driver with the OS, to conflicting Dynamic Link Libraries (DLL), resource conflicts, or unforgiving devices that crash when a user makes a mistake during installation.

Easy PC Initiative

The Easy PC Initiative is a multi-year effort between Microsoft and Intel. This initiative has already met with a considerable success in making the PC easier to set up, expand, and use by reducing legacy hardware and incorporating new hardware and operating system enhancements. Currently, Microsoft and Intel are working together to find ways to improve overall PC robustness as well. An example is inviting human factors engineers to industry plugfests to identify ease-of-use stumbling blocks at the earliest design stages.

Quality Roundtable for Consumer PCs

The PC Quality Roundtable brings together leading PC, networking, communications, peripheral, and other computing solution providers. Its purpose is to improve PC ease-of-use through analysis of shared data, publishing of design guidelines and tools to highlight key user tasks, and to advance the industry toward building easier, more intuitive computing products. The PC Quality Roundtable is currently working to improve robustness by working to identify the top 10 causes of interoperability problems industry wide. Once the group has completed this process, it will publish a white paper or a set of guidelines to help developers resolve these issues.

Quality Roundtable for Commercial PCs

The Commercial Roundtable was formed in 1999 to gain a solid understanding of business environment issues as they relate to ease-of-use. The roundtable provides a forum for collecting, sharing, and analyzing data for the commercial computing industry. Its ultimate goal is to find ways to reduce total cost of ownership, as well as reduce service calls for IT and OEMs.

The Commercial Roundtable is currently working to improve robustness by collecting information from all PC vendors about their top reliability issues. The group will use this information to determine the top reliability problems industry wide. The roundtable is also working with corporate IT organizations to determine the cost of various PC design decisions to IT organizations.

Summary

With the Easy PC Initiative and both Roundtable efforts, Intel and the PC industry have already significantly improved the set up and usability of the PC. In the future, all of these groups and their constituents will extend their efforts to develop guidelines for improving the robustness of PC systems.

To make these efforts a success, all hardware and software providers in the PC industry will need to work together to follow accepted development practices and the guidelines developed within these initiatives. By working together, developers will be able to address and resolve ease-of-use issues to deliver products the consumer views as intuitive, easy to use, and highly robust.

More Info

For the latest on ease-of-use, visit the Ease of Use Roundtable site and the Ease of Use Initiative page on the Intel Developer Site.

Author Bio

Alec Gefrides has been with Intel Corporation for four years. During the past year, he has worked as a marketing manager for the Ease of Use Initiative. Previously, he spent three years in Munich as a product marketing manager for Intel's wireless infrastructure business. Before joining Intel, Gefrides spent eight years in engineering and marketing at Siemens. Alec holds a B.S. in biomedical engineering from Texas A&M University.

Initiatives and Technologies

Reduce Development Time with the Intellectual Exchange

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HelloBrain, Inc.

Overview

HelloBrain, Inc. is a Web-based brokerage for specialized, high-tech projects. On HelloBrain, companies (buyers) can list open contracts, review bids, and negotiate contract terms. Contractors (sellers) can list skills, search for projects, and bid on relevant project opportunities. Intel® Intellectual Capital Exchange (IICE) is a Web-based exchange of intellectual capital (skills and other resources) among developers. Hosted and managed by HelloBrain, IICE is a brokerage service for developers working with Itanium™ processors, Pentium® processors, and other Intel-oriented technologies. Working together, HelloBrain and IICE help companies and contractors connect to, port, and develop solutions for their Intel technology-based applications. This collaboration makes it easier to locate competent resources, reduce development time, speed time-to-market, and improve innovation.

The Online Exchange Infrastructure

As an online exchange, HelloBrain provides the infrastructure for connecting high-tech buyers and sellers for development projects. For example, HelloBrain provides:

- Pricing mechanisms and information disclosure.
- Online collaboration, evaluation, verification, and delivery of product.
- Security and protection of intellectual property.

Buyers can use a variety of HelloBrain services to track and negotiate contract activity. Sellers can post their skills and availability in specific technologies, and can get immediately updated lists of matches for their skills to the currently open contracts.

Buyer and Seller Profiles

Companies listing open contracts on HelloBrain range from individuals to multinational corporations. Technology categories range from application software and firmware, to chip and circuit design, to Internet applications and communications technologies. Contract opportunities also run the gamut. For example, recent contracts requested developer expertise for wide-area network (WAN) controllers, custom SDRAM controllers, ASICs, timing analyses for microprocessors, C++ and UML development, and porting projects for UNIX*, Linux*, Windows*, and other operating systems.

Sellers may be individual contractors, subcontractors, service or solution providers, or full-fledged research houses. For example, one established seller is a research lab of more than 40 scientists with doctorates in computer science or electrical engineering. Many sellers from a variety of countries use HelloBrain to explore both domestic and overseas opportunities.

Intel® Intellectual Capital Exchange

Many HelloBrain projects accept bids from the global community of developers. However, HelloBrain also partners with companies to create more select, intellectual exchanges. Under these partnerships, companies accept bids only from a select or invited group of developers. IICE is one of these partnerships. Most projects listed on IICE are linked to Intel® processors.

Buyers wishing to list contracts for projects that deal with Intel® Architecture must first register with Intel® Developer Services (IDS). In turn, only sellers who have registered with IDS may bid on projects listed under IICE. Once registered and approved for both IDS and IICE, developers can bid on any open IICE project. By registering and vetting IICE users, IDS helps ensure that networking between companies and contractors is useful and appropriate.

Development Platforms

Developers often need state-of-the-art platforms on which to port software or develop Intel-oriented solutions. Intel® Early Access Services (IEAS) give IICE developers access to Itanium-based platforms in a variety of configurations. To use the platforms, developers must sign up for IDS and the IEAS services. Once approved for use of the available systems, developers can port, test, and run the applications for their HelloBrain contracts with privacy and security.

Summary

Intel is taking advantage of HelloBrain's online brokerage services to create a Web-based service exchange for developers. IICE is an intellectual brokerage service for companies and contractors working with Itanium, Pentium, and other Intel processor technologies. Managed by HelloBrain, IICE helps buyers and sellers post, search for, bid on, negotiate, and deliver final products. By using IICE services, those developing applications for Intel-based systems can reduce development time and speed time-to-market.

Intel is making its intellectual exchange even more efficient by offering developers early access to Itanium processor development platforms. Those who register with IDS and IEAS are able to use the secure platforms for development, test, and verification of their proposed contract solutions.

More Info

As a special for IDS members, HelloBrain will waive its fee for projects posted before May 31, 2001. To learn more about this offer, visit the HelloBrain Web site or contact the author of this article, Kasturi Gopalaswamy, at 408-987-8900 extension 317.

Articles describing Intel Early Access Services can be found in the archives of Intel Developer Update magazine. See the article titled "Remote Access to Pre-Release IA-64 Systems" from the October 2000 issue and "Security and Confidentiality for Intel® Early Access Services" from the November 2000 issue.

Author Bio

Kasturi Gopalaswamy, HelloBrain director of marketing, serves in the company's public-exchange business unit. Before joining HelloBrain, Kasturi worked for 18 years in the semiconductor and systems industries for companies such as National Semiconductor, Western Digital, Cirrus Logic, and NeoMagic. He was leader of the PCMCIA (Personal Computer Memory Card International Association) team at Cirrus, and was on the marketing team for the NeoMagic low-power graphic controllers. Kasturi holds two co-inventor patents in PCMCIA. He received his M.S.E.E. from Clarkson University.

New Initiatives in Peer-to-Peer Computing

Mike Leaffer
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Overview

Peer-to-peer computing is a concept known to many people only in its most recently and highly publicized incarnation: Napster. Yet peer-to-peer computing has been around for at least 30 years in one form or another. Intel has pursued peer-to-peer-focused initiatives for over a decade, and a number of large and small companies alike are now investing in major peer-to-peer endeavors. A natural fit with the global network of computers made available through the Internet, peer-to-peer computing offers enormous potential for accomplishing supercomputer-level tasks with existing, otherwise unused resources.

Peer-to-peer computing also presents great opportunity for the PC industry and for developers eager to build innovative peer-to-peer applications. Similar opportunity exists for developers to educate themselves about peer-to-peer computing, and to take an active role in its evolution, through a recently founded industry consortium known as the Peer-to-Peer Working Group.

Peer-to-Peer: Past, Present, and Future

While Napster may be the most widely known example of a contemporary peer-to-peer implementation, it may also be one of the most narrowly focused. That's because the Napster model takes advantage of only one of the many capabilities of peer-to-peer computing: file sharing. In fact, the technology has far broader capabilities, including the sharing of processing, memory, and storage, and support for collaboration among vast numbers of distributed computers.

In a peer-to-peer architecture, computers used traditionally as clients in a client/server network can instead communicate directly among themselves and, for maximum efficiency, can act as both clients and servers. Consequently, peer-to-peer computing can reduce the load on traditional servers and enable them to perform specialized services more effectively.

It also can act as a tool for bringing innovative solutions to complex network dilemmas and for promoting growth in the software and PC industry as those solutions are created. This is why large and small companies alike are investing millions of dollars in peer-to-peer initiatives, among them the following:

- *Collaboration.* Groove Networks has developed Internet communications software supporting real-time interaction with such capabilities as instant messaging, live voice, file sharing, and free-form drawing.
- *Distributed-resource computing.* Oculus Technologies is providing Ford Motor Company a way to use peer-to-peer computing on thousands of desktop PCs to produce more fuel-efficient cars. DataSynapse markets a peer-to-peer platform for distributing compute-intensive application processes to idle and underused resources in financial institutions. Entropia and Distributed Science have assembled global-computing grids with thousands of Internet PCs to test Web site Quality of Service levels. And Intel is collaborating on a major philanthropic effort with the American Cancer Society, University of Oxford, the National Foundation for Cancer Research, and United Devices to harness the power of millions of PCs over the Internet to research a cure for leukemia.
- *Edge services.* McAfee AsAP has introduced a technology enabling users to share anti-virus and firewall configuration updates with one another.
- *Intelligent agents.* Consilient enables businesses to create "intelligent agents" for automating business processes by moving control and data directly between peer clients via personalized user interfaces.

Academic peer-to-peer initiatives also are flourishing. In one of them, Intel is sponsoring a project at the MIT Media Lab that will deliver a generic peer-to-peer communications infrastructure featuring distributed multicast streaming protocols as well as algorithms for content discovery and query using metadata.

How You Can Become Involved

Clearly, peer-to-peer computing is gaining momentum, and now is the time for interested developers to become more involved by joining the Peer-to-Peer Working Group. Launched in November 2000, the group currently consists of 35 member companies devoted to the advancement of peer-to-peer infrastructure standards. Although Intel is one of the founding members, the group is an independent organization representing the viewpoints of large, established companies, such as Hewlett-Packard, Sony, Fujitsu, and J.D. Edwards, as well as those of relatively new ones, such as Endeavors Technology, Applied MetaComputing, Engenia, and Entropia. This makes the group an excellent venue for any developer wanting to accelerate the acceptance of peer-to-peer infrastructures and applications across the industry.

The Peer-to-Peer Working Group Demo Showcase and Meeting is scheduled for May 30–31 at the Santa Clara Marriott in Santa Clara, California. The event will feature demonstrations and discussions on the development of a peer-to-peer computing glossary and a peer-to-peer computing taxonomy, Network Address Translation, firewalls and other security issues, distributed file services, and more general topics including interoperability, privacy, performance, and infrastructure.

Perhaps the most pressing objective of the event will be to encourage greater involvement from both current and future member companies in the development of the group's technical direction. This creates an excellent opportunity for new members to make their voices heard by joining committees and debates, participating in the demo showcase, and publicizing ongoing projects through case studies and white papers.

Summary

As evidenced by the growing number of commercial and academic peer-to-peer projects at companies of all sizes, peer-to-peer computing offers a powerful solution to a wide variety of technology challenges. Peer-to-peer computing fits particularly well with the Internet, providing a promising opportunity for developers to use its underlying architecture as a resilient, worldwide network of resources. For developers eager to take advantage of this opportunity, the Peer-to-Peer Working Group offers an ideal place to start.

More Info

To register for the Peer-to-Peer Working Group Demo Showcase and Meeting being held May 30–31 in Santa Clara, California, visit the Peer-to-Peer Working Group's registration site. To learn more about joining the group, visit the Peer-to-Peer Working Group Web site.

For general information on the group, visit the Peer-to-Peer Working Group's home page.

For a closer look at the subject of peer-to-peer computing, see An Introduction to Peer-to-Peer Computing in the February 2001 issue of Intel Developer Update magazine.

Other information is available through the author of this article, Mike Leaffer.

Author Bio

Mike Leaffer was recently appointed peer-to-peer initiative manager in the Intel Technology Initiatives Marketing Group. He is chairperson of the Peer-to-Peer Working Group marketing committee. During his 10 years at Intel, Mike has been responsible for managing relationships with key companies such as Adobe, IBM, Mattel, and Sony. He has spearheaded company efforts to make the PC the platform of choice for entertainment and education applications and has been involved in driving early plug-and-play and graphics standards.

—End of Intel Developer Update Magazine Issue 21—